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# SOUTH FLORIDA WADING BIRD REPORT

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Volume 4, Issue 1

Dale E. Gawlik, Editor

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## Summary

The El Niño of 1997-98 delayed for up to several months the typical winter pattern of receding water levels. This late dry-down period coincided with reports of late nesting by wading birds in virtually all areas of south Florida. Regional differences in the start and end dates of the dry-down led to noticeable differences in the total length of the dry-down period. A cursory look at data from a small number of gauges suggested that the dry-down period lasted about four months in A.R.M. Loxahatchee National Wildlife Refuge (NWR), three months in Water Conservation Areas (WCA) 2 and 3, and less than two months in Everglades National Park.

The estimated number of wading bird nests (excluding Cattle Egrets because they are not dependent on wetlands) in south Florida in 1998 is 11,223. Regional coverage of the Report was expanded this year to include the J.N. "Ding" Darling NWR complex. If nests from the "Ding" Darling NWR complex are excluded to provide comparisons with previous years, the 1998 estimate is 10,762 nests. This estimate is down 1% from 1997, a year with a 17% reduction in nests from 1996.

Although total numbers of nests changed little from 1997, there was a shift in the location of nests. Estimated numbers of nests in the fresh water Everglades declined roughly the same amount (1,372

nests) as they increased in Florida Bay and the southwest coast (1,244 nests). The increase in coastal nesting suggests that coastal areas were not affected as much by the late dry-down period. Note that although numbers of nests in coastal regions increased, there was no increase in nesting in the marsh-mangrove ecotone where large colonies existed traditionally. In the fresh water Everglades, the magnitude of the decrease in nesting numbers from 1997 was more severe in the south (-3% in Loxahatchee NWR, -16% in WCA 2 and 3, -37% in Everglades National Park).

Preliminary data from aerial wading bird distribution surveys (includes non-nesting birds) in the WCAs indicate that total numbers of birds using that area declined 61% from 1997 whereas numbers of nesting birds declined only 11%. It appears that one response to this year's high water levels was for birds to simply leave the system. Of the birds that stayed, a greater percentage actually nested this year than last.

The only species that increased in all regions from 1997 was the Great Egret. This species increased from an estimated 3416 nesting pairs in 1997 to 4741 nesting pairs in 1998 (excluding "Ding" Darling NWR, which was not included in previous reports). From the perspective of ecosystem restoration, the Great Egret also was the only species that met numerical nesting targets proposed by the Science Subgroup to the South Florida Ecosystem Restoration Task Force. No other nesting targets for any species improved in 1998.

This report marks continued progress toward the management of south Florida as an ecosystem rather than as individual political units. Our knowledge of wading bird nesting patterns is still hampered by inconsistencies in survey methods, effort, and geographic coverage, such as the lack of surveys in Big Cypress National Preserve. These problems emerge any time a system-wide synthesis is attempted. If wading birds are to continue to play a key role in the management of south Florida's ecosystem, then all those involved should strive to eliminate inconsistencies and increase the reliability of our knowledge.

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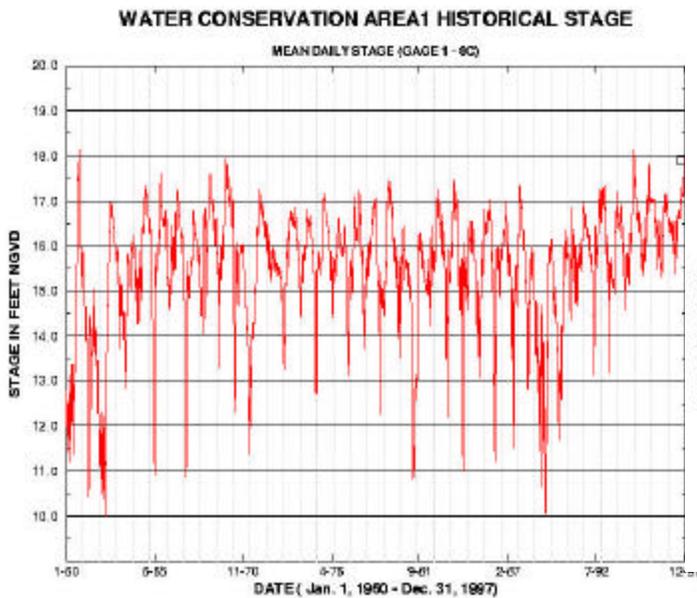
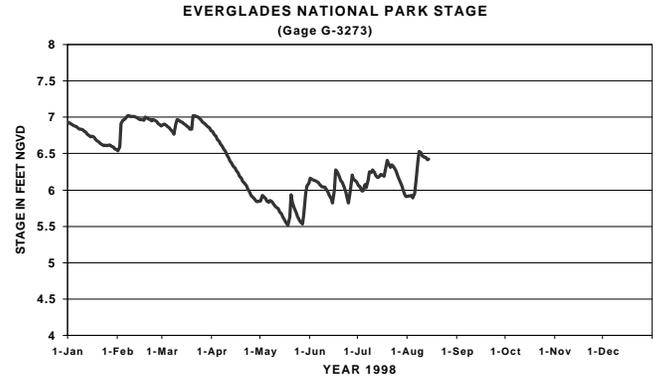
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# 1998 Hydrology

The stage hydrographs below depict the temporal patterns of water level change in three hydrologic units that support the majority of wading bird nesting. These figures allow for comparisons of the seasonal water level pattern among regions. They do not provide meaningful comparisons of water levels at any one point in time among regions because gauges represent sites with different hydroperiods. Gauges were selected primarily based on availability of data to the author.

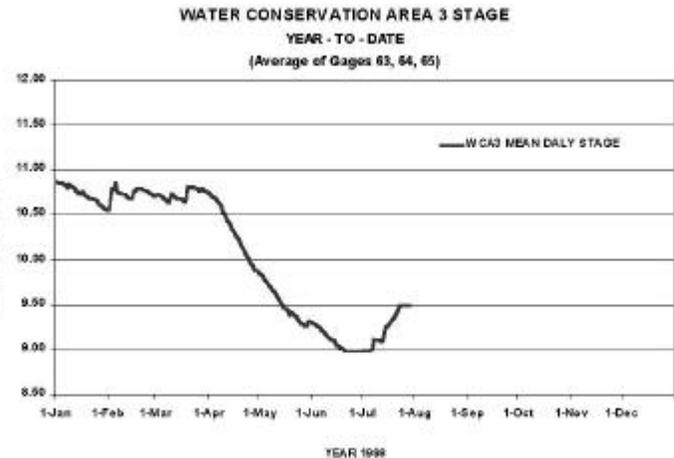
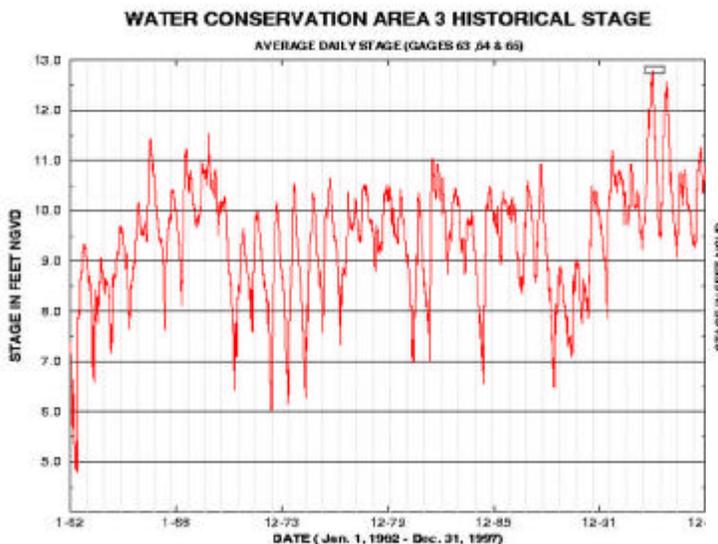
The effects of the 1997 El Niño year carried over into the



WCA1 Resource Assessment Database Hydrology Data Reporting Unit



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# Regional Nesting Reports

## **WATER CONSERVATION AREAS 2 AND 3**

winter of 1998 to produce what could be termed, “yet another unusual year”. It was noteworthy because water levels in the Everglades did not drop during the winter as they normally do. The first sign of a seasonal dry-down was in the A.R.M. Loxahatchee NWR in early March.

Staff at the refuge reported that the delay in the onset of the seasonal drop in water levels was further exacerbated by management decisions to hold more water in the refuge in order to prevent high water in Cape Sable Seaside Sparrow habitat, south of Tamiami Trail.

Contrasting with the high water during winter was a hot and dry summer and a delay in the onset of the rainy season, which usually occurs in May. By the end of June, water levels in the refuge were near the regulation schedule’s minimum of 14 ft. NGVD. The refuge experienced a dry-down period of about four months, during which there were occasional reversals in the pattern of receding water levels.

Water levels in WCA 3 and Everglades National Park did not start dropping until the first part of April, one month after they started receding in the refuge. The Water level continued to drop in WCA 3 until the first part of July, thereby producing a dry-down period of about three months (note that small reversals in the drying pattern for WCA 3 may have been masked because data were the average of three gauges). Water levels in Everglades National Park started to increase by mid May thus providing less than a two-month period of receding water levels.

Water levels in Big Cypress Preserve also stayed high throughout the winter. Deb Jansen reported that January water levels in Big Cypress were comparable to those in 1996 when extensive Wood Stork nesting was documented for the first time in decades. However, this year water inundated most of the Preserve until April.

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## **ABBREVIATIONS**

**Species:** Great Egret (GREG), Snowy Egret (SNEG), Reddish Egret (REEG), Cattle Egret (CAEG), Great Blue Heron (GBHE), Great White Heron (GWHE), Little Blue Heron (LBHE), Tricolored Heron (TRHE), Green Heron (GRHE), Black-crowned Night-Heron (BCNH), Yellow-crowned Night-Heron (YCNH), Roseate Spoonbill (ROSP), Wood Stork (WOST), White Ibis (WHIB), Glossy Ibis (GLIB), Anhinga (ANHI), Double-crested Cormorant (DCCO), Brown Pelican (BRPE), Osprey (OSPR), and Bald Eagle (BAEA).

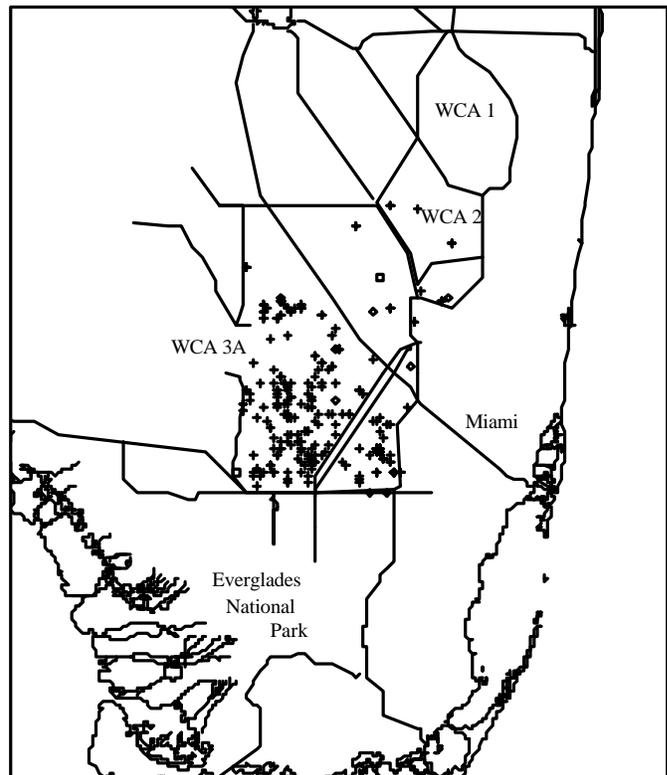
**Regions:** Water Conservation Area (WCA), Everglades National Park (ENP), and Wildlife Management Area (WMA).

During 1998, we performed aerial surveys of WCAs 2 and 3 during each month from February through July, and performed a systematic ground survey during April and May of the entire area by airboat. In addition to this, we made repeated visits to selected colonies for other studies.

By and large, wading birds nested quite late by comparison with all years on record. For example, our first recorded Great Egret nests were in mid to late March, and the bulk of nesting was in April. This is the first year of our records in which there were no Great Egrets nesting by the end of February, and the bulk of nesting was a minimum of four weeks later than usual. The same was true to a lesser degree for the small herons, which began at least two weeks later than usual, in late April and early May. White Ibises nested in May and June, which is either late by two months, or normal, depending on the year(s) of comparison.

We found a total of 4,651 pairs of all wading birds (excluding Cattle Egrets and all species in the Tamiami East and Tamiami West colonies) nesting within WCA 2 and 3. This is down considerably from the 1992 – 1997 average (62%) for the same area, similar to the average for 1986 – 1988 (85%), and quite

Locations of wading bird nests in WCA 2 and 3 during 1998.



low by comparison with the most recent high of 1992 (29%). Wood Storks did not nest at either of the Tamiami colonies this year, or at any location within WCA 2 or 3. Great Blue Herons began nesting over a month later than usual, and their numbers were down considerably from the regular 300 or so pairs that were typical of the early and mid-1990s. Great Egrets and Tricolored Herons were up slightly this year from the recent past, and Snowy Egret numbers were the lowest they have been during this decade. Similarly, Little Blue Herons were down considerably by comparison with the last decade, though searching effort during this period may have fluctuated. White Ibises were a vestige of their former

numbers in WCA 3 (fewer than 500 pairs). It is likely that the extremely high water was to blame for the decreases in nesting, particularly by depth-sensitive species like White Ibises, Wood Storks, and Snowy Egrets.

Nest success was not monitored directly this year, but we are able to make some observations based on what we saw during aerial and ground surveys, as well as colony visits. Great Egrets generally did well, and we had no instances of widespread abandonment during the season, perhaps because these birds were induced to nest well after the normal period of winter storms and cold fronts. White

**Numbers of wading bird nest initiations in Water Conservation Area 2 and 3 from January 1998 to July 1998. Colonies with 20 or more nests are listed individually.**

Colony name	Latitude dec. deg.	Longitude dec. deg.	GBHE	ANHI	LBHE	TRHE	DCCO	BCNH	CAEG	GREG	SNEG	WHIB	ROSP	Colony Total
Hidden	25.7988	80.8430		30	2	663				360	111	5		1,171
Alley North	26.1892	80.5258	6					15	40	475	60	500	10	1,106
2Bse-20	26.1467	80.3783	1	150	90	15			300	60				616
Mud Canal	26.0100	80.4608	3		20				275	95	17	30		440
unnamed	26.1443	80.7502					100			85				185
CypressCity	26.1242	80.5429	1	12						120				133
Starter Melaleuca	25.9408	80.6224		80						40				120
Big Melaleuca	26.0467	80.6250		2						105				107
unnamed	26.1457	80.7447								105				105
3BEMud	25.7970	80.4945								100				100
unnamed	25.9623	80.5720	1	40			12			40				93
Heron Alley	25.7976	80.5346		9	3	42					28			82
Crossover	25.9400	81.3325								80				80
unnamed	25.7983	80.7627								80				80
unnamed	26.0490	80.6167								75				75
L-67	25.9555	80.5653	4							62				66
North 3A	26.1224	80.7819		3						60				63
unnamed	26.1010	80.4540	2	10						50				62
JW2	26.1253	80.7323		1	10	10				30	10			61
unnamed	26.1435	80.7493	1							60				61
unnamed	26.3300	80.5012								60				60
unnamed	25.9652	80.8207			40	15								55
Andytown	26.1250	80.5046	3	35						13				51
unnamed	25.9168	80.5987	2	45										47
unnamed	25.8383	80.5255								47				47
unnamed	25.9225	80.8300								40				40
3B-Ag Canal East	25.7982	80.4834		38										38
North 3A	26.0341	80.6747		1	30	5								36
3B-Ag Canal North	25.8275	80.5200	1				35							36
unnamed	26.0158	80.6590								36				36
3A	25.8190	80.6775	2	16		4				7				29
unnamed	26.1150	80.6598								35				35
unnamed	26.1233	80.7282								35				35
unnamed	25.8399	80.5315	2	15	2	3				10				32
unnamed	25.8497	80.5317								32				32
JWnew	26.1088	80.7527	4							25				29
unnamed	26.1393	80.3892					29							29
unnamed	26.1300	80.7008								28				28
unnamed	26.1343	80.7025								25				25
unnamed	26.1093	80.7850								23				23
unnamed	25.8150	80.6043								22				22
unnamed	26.1300	80.7035	1							20				21
unnamed	25.9662	80.5727								20				20
unnamed	26.2913	80.5832								20				20
Sum of colonies with <20 nests			146	300	12	46	12	1	0	92	0	0	0	598
<b>Species Total</b>			<b>180</b>	<b>787</b>	<b>209</b>	<b>803</b>	<b>188</b>	<b>16</b>	<b>615</b>	<b>2,672</b>	<b>226</b>	<b>535</b>	<b>10</b>	<b>6,241</b>

Ibises nested only at Alley North, and may have initiated as many as 500 nests. However, repeat flybys and visits to the colony suggest that the majority of these nests were abandoned before chicks hatched, and that fewer than 100 nests actually produced fledglings in early July.

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**EVERGLADES NATIONAL PARK**

Park biologists flew three colony surveys during the 1998 nesting season. Both traditional colony sites as well as new colonies discovered during Systematic Reconnaissance Flights were surveyed. Flights were conducted using a Cessna 182 fixed-wing aircraft on 16 February, 26 April, and 11 June, 1998. As a result of the delayed winter dry-down, initiation of nesting did not occur until late in the season.

There were an estimated 756 wading bird nests (642 excluding Cattle Egrets) on the mainland colonies during the 1998 surveys. The estimate excluding Cattle Egrets, is down 37% from 1997, and represents the lowest nesting effort in the Park's history. Great Egrets, Great White Herons, Wood Storks, and Cattle Egrets were the only species recorded nesting. Nesting at the traditional sites was restricted to the Rodgers River Bay colony. This is the fifth consecutive year that the traditional colony sites at Lane River, East River and Cuthbert Lake were not used.

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**Numbers of wading bird nests in Everglades National Park, February-June 1998**

Colony Name and Location	Date	GREG	WOST	GWHE	CAEG	Status*
Upper Taylor Slough SW corner of L31W & main ENP road	2/16/98					IA
	4/21/98					IA
Madeira Ditches 25' 19.39 / 80' 38.74	2/16/98					IA
	4/21/98					IA
	6/11/98					IA
Madeira 25' 13.10 / 80' 39.64	2/16/98					IA
	4/21/98					IA
	6/11/98					IA
Cuthbert Lake 25' 12.56 / 80' 46.50	2/16/98			4		IA
	4/21/98					IA
	6/11/98					IA
Frank Key 25' 06.17 / 80' 54.39						B
Paurotis Pond 25' 16.89 / 80' 48.18	2/16/98					IA
	4/21/98	75	25			
	6/11/98	20	5			
East River Rookery 25' 16.08 / 80' 52.03	2/16/98					IA
	4/21/98					IA
	6/11/98					IA
Lane River Rookery 25' 18.02 / 80' 53.18	2/16/98					IA
	4/21/98					IA
	6/11/98					IA
Rodgers River Bay 25' 33.40 / 81' 04.19	2/16/98					IA
	4/21/98	100				
	6/11/98	10				IA
N. of 10 mile corner 25' 40.67 / 80' 49.29						IA
Preserve Pond Apple 25' 40.51 / 80' 55.87						IA
East Slough 25' 36.32 / 80' 50.24	2/16/98					IA
	4/21/98	35				
	6/11/98					IA
West of Obsv. Tower 25' 39.48 / 80' 47.96	2/16/98					IA
	4/21/98	20				
	6/11/98					IA
Pond Apple Hammock 25' 44.20 / 80' 44.10						IA
Tamiami West ** 25' 45.47 / 80' 32.69		250				
Tamiami East ** 25' 45.48 / 80' 30.47		57				
NE Grossman (b) 25' 41.10 / 80' 34.50	2/16/98					IA
	4/21/98					IA
	6/11/98				20	
NE Grossman (a) 25' 38.81 / 80' 36.55	2/16/98					IA
	4/21/98	20				
	6/11/98				100	
Grossman Ridge 25' 37.68 / 80' 38.74	2/16/98					IA
	4/21/98	30				
	6/11/98	50				
"A-1997" 25' 42.63 / 80' 35.65						IA
<b>Total***</b>		607	25	4	120	

\* IA = Inactive, B = See Florida Bay Section

\*\* Data collected by Peter Frederick

\*\*\* Totals are sum of maximum counts per colony

## FLORIDA BAY

An aerial survey of wading bird activity in Florida Bay has been conducted since April, 1995, and now more than three years of observations on nesting bird activity have been compiled (See Table on Pg. 7). The platform is an H-65 Dolphin helicopter furnished by the Miami Station of the U.S. Coast Guard. Our coverage in January, 1998, was incomplete and did not include the western bay (i.e., Derelect to Sandy Keys).

The largest wading bird colonies, consisting of more than 100 birds, are consistently located on Tern Key in the northeastern bay and Frank and Sandy Keys in the northwestern bay. Nesting also occurs on many other islands in the bay. Great White Heron nesting is distributed over much of the bay, and colonies are made up of a relatively small number of birds (e.g., from three or four nests to 20 or more).

Birds we observed nesting in the bay include seven wading bird species (Great White Heron, Great Blue Heron, Great Egret, Snowy Egret, Roseate Spoonbill, White Ibis, and Tricolored Heron), two large diving bird species (Double-crested Cormorant and Brown Pelican), and two raptors (Bald Eagle and Osprey).

The period from July to September is one of low nesting activity in the Bay. During the first two years, maximum nesting activity occurred in the winter or early spring for most species. Within the 1997-1998 period, less nesting activity was observed during winter and early spring and relatively more nesting activity in April through June. Great White Herons were observed nesting in all but three of the 40 months covered by the census. Intensive nesting by the Brown Pelican in the Bay extends from November to May. White Ibises, Snowy Egrets, and Tricolored Herons nest later, in late spring and early summer.

A relatively large concentration of White Ibises (150 birds) that may have been nesting was observed at Frank Key in May, 1998, but not in June or July. Ibis nesting activity was observed at Tern Key in June but not in May or July, 1998. Tricolored Herons probably were nesting at Tern Key in July, 1998, because the birds were concentrated there in relatively large number (158 birds).

Observations of Snowy Egrets nesting in the bay are infrequent; however, a small nesting group was found in April, 1996, and a larger nesting group was observed in July, 1997. A large concentration of Snowy Egrets perched and flying (total of 185 birds) was observed at Frank Key in July, 1998, and these birds may have been nesting. A smaller group of Snowy Egrets (25 birds) that was possibly nesting was observed at Tern Key that same month.

Great Egret nesting in the bay was sizeable in 1996 (195 nests), minimal in 1997 (75 nests), and high again in 1998 (308 nests).

Roseate Spoonbill nesting in the bay was observed in all

three years within the period from October through March.

Although we have a few observations of nesting by Tricolored Herons and Roseate Spoonbills, we are not able to see their nests well from the air; therefore, our records do not provide a complete picture of nesting activity for these species.

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### RESEARCH CONTACTS

Although much of the work on wading birds in south Florida is aimed at monitoring nesting numbers, there is actually a wide range of research projects underway. A sampling of those projects is listed below (phone number and affiliation for first person listed).

- Roseate Spoonbill nesting in Florida Bay – Elsa Alvear, Sheila Mahoney, and John Ogden (FAU, 561-367-3336)
- Snowy Egret body condition/food intake – Johanna Salatas and Peter Frederick (UF, 352-846-0565)
- Snowy Egret juvenile growth and survival – Lisa Borgia, Victor Apanius, and Dale Gawlik (FIU, 305-223-7448)
- White Ibis and Scarlet Ibis adult body condition – Julie Heath, Greg Babbit, and Peter Frederick (UF, 352-846-0565)
- Foraging distribution and habitat use in ENP – Sonny Bass (ENP, 305-242-7833)
- Foraging distribution and habitat use in Holey Land and Rotenberger WMAs – Blake Sasse (FGFWFC, 561-791-4052)
- Foraging distribution and habitat use in the WCAs – Dale Gawlik, Tom Bancroft, Ken Rutchev, and Dave Nelson (SFWMD, 561-682-6712)
- Foraging behavior in the WCAs – Jim Surdick and Peter Frederick (UF, 352-846-0565)
- Foraging behavior and site selection experiments – Dale Gawlik (SFWMD, 561-682-6712)
- Effects of mercury – Peter Frederick and Marilyn Spalding (UF, 352-846-0565)
- Effects of powerlines – Jie Deng and Peter Frederick (UF, 352-846-0565)
- Large-scale movements and population structure – Stefani Melvin and Dale Gawlik (SFWMD, 561-682-6616)
- Individual-based model – Wilfried Wolff (UM, 305-284-1690)



**Number of nests observed in Florida Bay, by month.**

Year	Month	GWHE	GBHE	GREG	REEG	TRHE	SNEG	WHIB	ROSP	DCCO	BRPE	BAEA	OSPR	Total
1995	Apr	1	4	0	0	0	0	0	0	0	0	22	15	42
1995	May	17	0	27	0	0	0	40	0	45	10	31	93	263
1995	Jun	0	0	0	0	0	0	0	0	0	0	14	10	24
1995	Jul	1	0	0	2	50	0	0	0	6	0	25	77	161
1995	Aug	0	0	0	0	0	0	0	0	0	0	33	87	120
1995	Sep	2	0	0	0	0	0	0	0	0	0	26	102	130
1995	Oct	14	0	0	0	0	0	0	0	0	0	40	174	228
1995	Nov	120	4	0	0	0	0	0	45	0	75	38	124	406
1995	Dec	189	6	10	0	0	0	0	12	0	50	33	150	450
1996	Jan	257	33	130	0	0	0	0	18	0	225	21	120	804
1996	Feb	188	20	165	1	0	0	0	9	75	365	26	116	965
1996	Mar	152	24	195	0	1	0	101	21	50	350	32	126	1052
1996	Apr	104	6	84	0	10	10	275	0	0	251	3	26	769
1996	May	71	15	163	0	29	0	200	0	10	168	1	6	663
1996	Jun	14	3	20	0	0	0	150	0	25	40	0	0	252
1996	Jul	17	0	3	0	0	5	0	0	50	0	2	0	77
1996	Aug	4	1	0	0	0	0	0	0	0	0	0	0	5
1996	Sep	35	0	0	0	0	0	0	0	20	0	0	0	55
1996	Oct	81	5	0	0	0	0	0	0	0	0	2	4	92
1996	Nov	90	6	0	0	0	0	0	20	0	77	0	3	196
1996	Dec	131	21	0	0	0	0	0	40	50	100	0	23	365
1997	Jan	200	20	0	0	20	0	0	24	75	235	4	29	607
1997	Feb	153	15	0	0	0	0	0	0	50	275	3	27	523
1997	Mar	133	48	75	0	0	0	0	0	55	420	7	31	769
1997	Apr	80	3	30	0	0	0	0	0	110	270	8	0	501
1997	May	30	1	0	0	0	1	75	0	50	40	0	0	197
1997	Jun	9	0	0	0	50	0	100	0	0	0	0	0	159
1997	Jul	15	0	75	0	50	75	50	0	35	0	0	0	300
1997	Aug	7	0	50	0	50	10	0	0	51	0	0	0	168
1997	Sep	11	0	0	0	0	0	0	0	20	0	0	0	31
1997	Oct	0	0	0	0	0	0	0	12	25	0	0	1	38
1997	Nov	139	5	37	0	0	0	0	20	10	0	0	9	220
1997	Dec	171	13	0	0	0	0	0	50	51	0	0	27	312
1998	Jan	79	15	0	0	0	0	0	30	0	0	1	17	142
1998	Feb	52	4	0	0	0	0	0	0	0	190	1	16	263
1998	Mar	19	1	0	0	0	0	0	0	0	81	0	6	107
1998	Apr	34	9	308	0	0	0	0	0	5	200	2	7	565
1998	May	16	1	0	0	0	0	0	0	10	16	0	0	43
1998	Jun	15	0	100	2	220	20	200	0	5	30	0	0	592
1998	Jul	6	0	12	0	0	0	0	0	0	0	0	30	48

## FLORIDA WADING BIRD GROUP

The Florida Wading Bird Group (FWBG) is a volunteer organization composed of scientists and birders interested in monitoring the health of wading bird populations and their wetland habitats. State and federal agencies, as well as private organizations such as the Audubon Society, are monitoring wading birds because these top predators are highly visible to the public and symbolic of Florida's extensive wetlands. In addition, wading birds are useful indicators of changes in wetlands over time. Water Management Districts, in particular, are monitoring wading bird populations in wetlands undergoing restoration in order to help determine restoration success. The FWBG grew out of a need to standardize and coordinate wading bird surveys, and to interpret data. All persons interested in wading birds are welcome to join the group. **Website:** [www.flmnh.ufl.edu/wadingbirds](http://www.flmnh.ufl.edu/wadingbirds)

### Objectives

1. To coordinate timing of existing nonbreeding and nesting wading bird surveys.
2. To calculate regional population estimates for each survey area through statistically sound design and estimation methods.
3. To distribute information through a web page.
4. To facilitate the examination of trends in historic data.
5. To encourage future systems and surveyors to cooperate with FWBG and accommodate its objectives into the survey method.
6. To coordinate with statewide wading bird surveys conducted by the Florida Game and Fresh Water Fish Commission.

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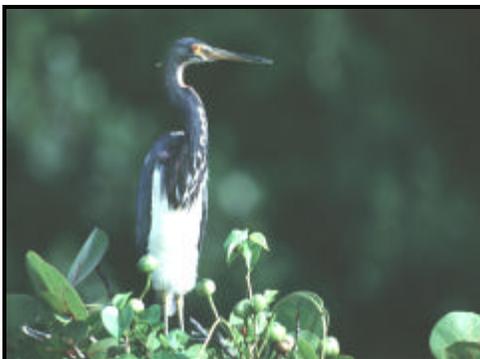
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## HOLEY LAND AND ROTENBURGER WMAs

No specific wading bird nesting survey was performed, but we did monthly aerial fixed-wing wading bird foraging surveys (10% coverage) and deer population surveys in May and June (20% coverage). We also conducted alligator nest (early July) and deer recruitment surveys (April) from helicopters that should have allowed us to observe nesting by the more visible wading birds. Artificial islands in Holey Land WMA were surveyed by airboat in late March/early April.

Five Yellow-crowned Night-Heron nests were discovered on artificial island No. 5 in the Holey Land WMA during an airboat survey on 26 March. About 10 Tricolored Herons were observed nesting on this same island during an aerial alligator nest survey on 8 July. This artificial island, approximately 0.03 ha in size with willow as the dominant overstory tree on and around it, was built in the early 1970s. It was surrounded by a small pool of water that was created by dredging up muck for the island.

The rainy weather early this year increased the number of wading birds foraging in Rotenberger WMA to some of the highest levels seen in 12 years of surveys. Rotenberger is usually dry from December-June, but this year had shallow surface water over recent prescribed burns, which attracted birds that were probably forced out of the Everglades by high water. However, the "drought" of late spring returned Rotenberger WMA to normal dry conditions and no nesting was observed.

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## BIG CYPRESS NATIONAL PRESERVE

No systematic surveys were done by the staff. The only documented Wood Stork nesting was in the Deep Lake Strand where three stork nests, each containing two eggs, were observed on 19 May. The nests were abandoned within three weeks.

Great Blue Heron and Great Egret nests were observed at several sites having small ponds in cypress domes or wet prairie depressions.

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## A.R.M. LOXAHATCHEE NATIONAL WILDLIFE REFUGE

In 1998, a total of 35 hours of airboat survey effort were conducted from 23 April - 15 May. An approximately 30-minute helicopter observation of three specific colonies inaccessible by airboat took place 22 and 23 June. Nest estimates for each species were derived by either counting actual nests at each colony or by counting the number of flushed, tending adults. Only one survey effort was undertaken this year due to delayed nesting, followed by extremely low water levels.

Nesting attempts by small species were delayed, probably because deep water in the winter dispersed fish populations and reduced foraging efficiency. Tall waders such as Great Blue Herons and Great Egrets appeared to forage well and their nesting behavior was not deterred by high water levels. In late May water levels dropped rapidly (by the Corps of Engineers), and short waders began nesting. Low water levels and a delay in the start of the rainy season were important for successful nesting this year because they concentrated forage fish in areas of shallow water.

The location of nesting colonies did not follow past patterns closely. The observed trend of colony establishment in more widespread locations, especially in the northern half of the refuge, was not observed during the 1998 season. Some previously known colonies had only three or four bird nests, some had moved approximately 0.5 miles and some were not found at all. Twelve colonies observed in 1997 were not utilized this year. These former colony sites were spread throughout the central and southern portions of the refuge interior. No new colonies were found, yet the overall number of estimated nests was greater in 1998 than in 1997. The 1998 nesting season was late to start, and the survey occurred while many colonies were getting established. Therefore, nest estimates are conservative.

Approximately 65 Glossy Ibises were observed in the same nesting colony as last year (26°33.68' N, 80°14.99' W). Attempts were made to see if chicks were present, but low water prevented

airboat access. Survey estimates showed three waders had decreased nesting activity in 1998. For the second consecutive year, Little Blue Heron nest estimates declined. Snowy Egret nesting activity was very poor this year, but not unexpected. Snowy Egrets were observed by the field biologist foraging only in very low water, which was not available from December to late April. By the time the refuge water levels came down, Snowy Egrets may have been nesting elsewhere. White Ibis nesting estimates fluctuated greatly each year since 1992. White Ibis estimates were 20% lower than last year's estimate, with only two large colonies located. However, White Ibises tend to nest later than other waders at the refuge and perhaps some of their nests were not established at survey time. Four species increased nesting activity in 1998. Tricolored Heron nesting was up 38% from 1997 and has steadily increased since 1993. Great Blue Heron nesting has continued to increase from 1992. Great Egrets rebounded from a dip in 1997 numbers, showing a generalized increase since 1992. Cattle Egrets increased over 1997 estimates but have not attained the numbers of 1996.

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**Estimated numbers of wading bird nests at A.R.M. Loxahatchee National Wildlife Refuge 1992-1998.**

<b>Species</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>
Little Blue Heron	938	673	1333	1153	1372	1311	1036
Tricolored Heron	520	173	103	343	197	254	352
Great Blue Heron	87	73	73	82	118	95	123
Great Egret	239	328	396	610	837	516	828
Snowy Egret	97	4	21	59	28	73	15
Cattle Egret	1408	728	1051	729	2403	1028	1682
White Ibis	2761	218	1849	2249	800	1095	873
Unk. Small Wading birds	0	378	0	0	0	0	37
<b>Total Nests</b>	<b>6050</b>	<b>2575</b>	<b>4826</b>	<b>5225</b>	<b>5755</b>	<b>4372</b>	<b>4909</b>
<b>Total Nests w/o Cattle Egrets</b>	<b>4642</b>	<b>1847</b>	<b>3775</b>	<b>4496</b>	<b>3352</b>	<b>3344</b>	<b>3227</b>

## SOUTHWEST COAST

As of 3 July, most waders in the colonies I monitored had completed nesting. Numbers of waders feeding along the mangrove edge in the estuaries increased slightly in 1998.

For the Rookery Bay Colony, nesting was about equal to the 15-year mean (1983-1998), even though birds relocated from the traditional colony to two nearby islands (See table below). In the Marco Colony, total waders were up about 25% from the 15-year mean; all of the increase was due to Great Egrets and Cattle Egrets. Snowy Egrets and Tricolored Herons decreased moderately and Little Blue Herons were almost nonexistent. Total nests at East River were up 41% from the 15-year mean. Almost all of the increase was due to Snowy Egrets and Little Blue Herons. The Indian Key Pass Colony failed completely (my guess is too many tour boats). In Chokoloskee Bay, Great Egrets increased to 68 nests. Great Egrets nested there in the 1970's and disappeared until last year when there were eight nests. At Chokoloskee Pass, a small colony I found last year, Brown Pelicans and Great Egrets increased. Although I recorded no small herons nesting at these colonies, I saw several Snowy Egrets and Tricolored Herons in breeding plumage.

**Great Egret:** This species had the highest number of nests (up 48% from the 15-year mean) and the most fledglings since 1983. During the first three months of the nesting season there were average numbers of birds coming into the night roosts, but as chicks fledged, numbers increased. This may indicate that the young are staying in the area, at least for a while. For the first three months of the year, numbers of birds at the night roosts were low, but then increased to near the 15-year mean. Since 1983, there appears to be an increase in the numbers of Great Egret nests, but not in the numbers of individuals coming into night roosts at Rookery Bay and Marco ABC.

**Snowy Egret:** This year the number of nests and birds in the area was about average, as was apparent productivity. For the first three months of the year, numbers coming into night roosts were low, but then increased to near the 15-year mean. There has been a lot of variation in the numbers of nests since 1983 but there appears to be no

trend, possibly indicating a stable population.

**Little Blue Heron:** Nesting numbers were down 51% from the 15-year mean. For the first three months of the year numbers of birds at night roosts were low, but then increased almost to the mean.

**Tricolored Heron:** Nesting numbers were down 4% from the 15-year mean. Although there is no strong trend over the period of study, numbers have been low for the last five years. For the first three months of the year, numbers at night roosts were low, but then approached the 15-year mean.

**Cattle Egret:** The numbers of nests was the second lowest for the period of study (down 32% for the 15-year mean). For the first three months of the year, numbers at night roosts were low but then approached the mean. Over the 15-year period there has been a lot of variation in the numbers and no trend, possibly indicating a stable population in the area.

**White Ibis:** This species did not even attempt to nest at Marco, where there have been a few (10-25) nests in the last three years. Although preliminary, numbers of fledglings at night roosts were low for July (7% of total White Ibises that arrived compared to a mean of 14%), which may reflect lower productivity this year.

In summary, there has been considerable variation over the years in the numbers of individuals using the area and no obvious trend. Total numbers of waders using the area seem to be relatively stable, as does each species. This may indicate relatively stable populations but a more rigorous statistical analysis is needed to know for sure.

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#### Numbers of active wading bird nests on the southwest coast of Florida, 1998.

	GBHE	GREG	SNEG	LBHE	TRHE	REEG	WHIB	GLIB	CAEG	Total
Chokoloskee Pass (25°46'N-81°24'W)	0	2	0	0	0	0	0	0	0	2
Chokoloskee Bay (25°50'N-81°24'W)	0	57	0	0	0	0	0	0	0	57
East River (25°55'N-81°26'W)	0	0	123	22	216	0	0	0	0	361
Marco (ABC) (25°57'N-81°42'W)	22	254	153	2	118	3	0	36	249	837
Indian Key Pass Colony (25°49'N-81°27'W)	0	0	0	0	0	0	0	0	0	0
Rookery Bay (26°01'N-81°44'W)	0	13	71	14	141	0	0	0	82	321
<b>Total 1998</b>	<b>22</b>	<b>326</b>	<b>347</b>	<b>38</b>	<b>475</b>	<b>3</b>	<b>0</b>	<b>36</b>	<b>331</b>	<b>1578</b>
<b>Mean total 1983-1998</b>	<b>7</b>	<b>170</b>	<b>324</b>	<b>78</b>	<b>551</b>	<b>3</b>	<b>9</b>	<b>44</b>	<b>490</b>	<b>1676</b>

## J.N. "DING" DARLING NATIONAL WILDLIFE REFUGE COMPLEX

Colonial nesting bird surveys are conducted via motorboat once per month each year during the months of April to August. Total nests are estimated from the maximum total number of nest-tending adult birds tallied during surveys. Trends in the maximum total number of estimated nests over the last seven years indicate a 52% decline in overall nesting effort since 1992 (see Figure below). We speculate that this continuous, steady downward trend in nesting effort is associated with declining habitat quality and forage availability. Sanibel Island habitats have generally become more forested as compared to conditions in the 1950's. Interior wetlands have been drained, developed or degraded, affecting habitat quality for foraging parents that feed on the island.

Colonial nesting bird surveys also include a monthly tally of juvenile and nestling pelicans at all islands surveyed. An index to recruitment is estimated from the maximum total number of pelican nestlings tallied during surveys. While juvenile pelicans are tallied and reported, these figures do not represent indices of production because some juvenile pelicans may not have been recruited during the current nesting season. The 1998 overall total estimated peak nestling recruitment was 386 pelican nestlings, a 261% increase over the 1997 estimate ( $n = 107$ ). The 1998 overall total juvenile pelican estimate was 586. While these figures do not represent accurate indices to production, we noted a 189% increase in juvenile estimates over 1997 ( $n = 203$ ). Combined nestling and juvenile estimates indicate a significant increase in recruitment this year as compared to 1997.

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## UPCOMING MEETINGS

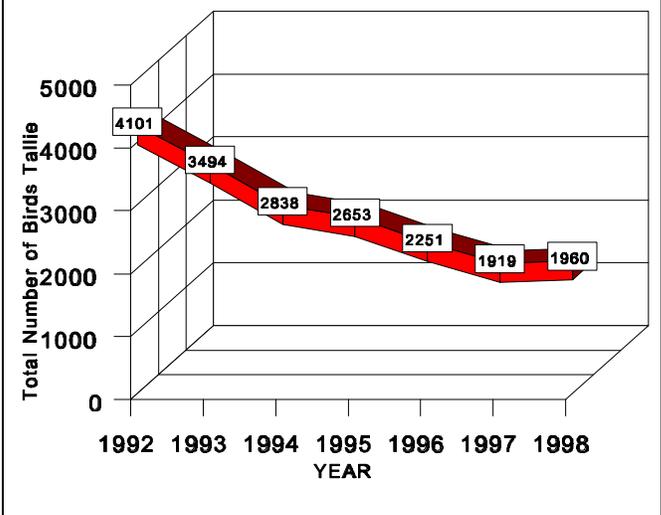
Florida Ornithological Society: 16-18 Oct. 1998, Jacksonville Beach, Florida.

Colonial Waterbird Society: 21-24 Oct. 1998, Miami, Florida.

Flamingo Specialist Group: 24-26 Oct. 1998, Miami, Florida.

Society for Ecological Restoration: 28-30 Sep. 1998, Austin, Texas.

Fig. 1. Overall Trends in Refuge Complex Nesting Effort at Tarpon Bay Keys and Florida Gulf Refuge Islands, 1992-98.



### Colonial bird nesting surveys for J. N. "Ding" Darling National Wildlife Refuge Complex, April–August, 1998. Counts reflect the maximum number of nest-tending adults during five monthly surveys.

	GBHE	LBHE	GREG	SNEG	TRHE	REEG	BCNH	YCNH	WHIB	GRHE	ANHI	DCCO	BRPE	CAEG	Total
Tarpon Bay Keys	8	1	35	13	8	1	3	3	0	0	0	49	79	4	204
Hemp Isl.	4	0	3	7	144	2	2		27	0	0	100	260	13	562
Bird Key	0	1	1	2	14	1	0	0	22	1	0	42	302	0	386
Broken Isl.	4	1	1	3	9	0	1	0	0	0	3	106	215	2	345
Upper Bird Isl.	6	2	7	9	45	2	1	0	2	0	1	15	127	7	224
Lower Bird Isl.	1	0	2	0	4	0	0	0	0	0	0	7	42	0	56
Lumpkin Isl.	2	1	0	7	46	1	1	0	1	0	37	60	3	24	183
<b>Total</b>	<b>25</b>	<b>6</b>	<b>49</b>	<b>41</b>	<b>270</b>	<b>7</b>	<b>8</b>	<b>3</b>	<b>52</b>	<b>1</b>	<b>41</b>	<b>379</b>	<b>1028</b>	<b>50</b>	<b>1960</b>

# Systematic Reconnaissance Flights

Wading bird surveys were flown with a fixed-wing aircraft at an altitude of 60 meters along 50 parallel transects with 2-km spacing in the WCAs from January to June 1998. The Holey Land WMA and Everglades Nutrient Removal Project, which are adjacent to the WCAs, also were surveyed each month by Dave Nelson and Craig Theriot, of the USACOE Waterways Experiment Station. Wading birds were enumerated, their positions recorded, entered into a database, and summarized into tables. Densities of each species were separated into 4-km squared cells and plotted onto maps of the study area.

We are still using the high-resolution digital video linked with GPS positions to record each transect, but we are not using the tapes as an identification tool for wading birds. We mainly record the vegetation types within each transect. We currently have about 100 hours of archived video for 1996-1998 surveys.

We began the 1998 survey year collecting data on two small

palm top computers with touch screen features that assisted us in real time computerized data entry which was linked to a GPS unit. The data were then transferred into the database and edited.

Because of the high water levels throughout the WCAs for most of the year, the estimated abundance of wading birds (all species combined) were substantially lower than last year (61% decrease from 1997). Uncharacteristically, June had more wading birds than any other month. Higher water levels made it especially hard for the short-legged species, like the White Ibis, to feed. Their numbers were down 68% from last year.

The final report for the 1996 and 1997 surveys are currently available from the USACOE Waterways Experiment Station and the 1998 report should be completed by October 1998.

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## **Estimated abundance of wading birds in the Water Conservation Areas, 1998.**

<b>Species</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>
Great Blue Herons	1,133	673	473	560	540	693
Great Egrets	8,633	6,833	7,347	7,127	8,707	14,033
Small Dark Herons	260	93	100	333	167	540
Small White Herons	100	60	147	247	253	1,140
White Ibises	6,540	1,253	1,413	9,620	12,140	20,453
Glossy Ibises	193	47	13	180	73	53
Wood Storks	221	47	47	20	40	420
Other*	7	7	0	13	133	200
<b>Total Abundance</b>	<b>17,087</b>	<b>9,013</b>	<b>9,540</b>	<b>18,100</b>	<b>22,053</b>	<b>37,533</b>

\* Includes Cattle Egret,  
Great White Heron and  
Roseate Spoonbill

## **Estimated abundance of wading birds (all species combined) in the Water Conservation Areas, 1998.**

<b>Month</b>	<b>1</b>	<b>2A</b>	<b>2B</b>	<b>3A</b>	<b>3B</b>	<b>Total</b>
Jan	6,360	3,427	67	6,807	426	<b>17,087</b>
Feb	2,880	967	120	4,747	300	<b>9,013</b>
Mar	3,673	353	87	4,993	433	<b>9,540</b>
Apr	10,627	440	440	6,287	307	<b>18,100</b>
May	7,620	773	47	13,333	280	<b>22,053</b>
Jun	18,400	6,093	113	12,260	667	<b>37,533</b>

# Status of Wading Bird Recovery –1998

The former Science Subgroup (now Science Coordination Team) of the South Florida Ecosystem Restoration Task Force and Working Group prepared a set of recommendations for success measures for the south Florida ecosystem restoration program (Science Subgroup 1997). Included in these recommendations are targets for the recovery of nesting wading birds in the Everglades basin (WCAs and ENP; Ogden et al 1997). The wading bird success measures are three nesting parameters (number of nesting birds, seasonal timing of nesting, and locations of colonies), for five characteristic species in mainland Everglades colonies (Great Egret, Snowy Egret, Tricolored Heron, White Ibis, Wood Stork). For each of these three parameters, and for each species, the most recent, annual patterns of nesting are compared to a base condition derived from nesting patterns during the 10-year period, 1986-1995. To minimize the affects of survey error, as well as the large interannual variation in nesting effort, three-year running averages are used. Annual evaluations of nesting wading birds using these parameters were previously reported by Gawlik and Ogden (1996), and Ogden (1997). The following evaluation, the third annual report in this wading bird "report card" format, is derived from 1998 nesting information contained elsewhere in this document (see Bass & Osborne, Frederick & Fontaine, and Bailey et al. in this report).

## Numbers of Nesting Birds

In 1998, the combined nesting effort (total of maximum estimates of active nests for each colony) for A.R.M. Loxahatchee National Wildlife Refuge, WCAs 2 and 3, and mainland ENP, was 4,107 nesting pairs of Great Egrets, 241 pairs of Snowy Egrets, 1,155 pairs of Tricolored Herons, 1,408 pairs of White Ibises and 25 nesting pairs of Wood Storks. The total number of nesting pairs was 8,012 in 1996, 8,301 in 1997, and 6,936 in 1998. The following table lists the highest and lowest values among the three year running averages for the base years, 1986-1995, the three year running averages for the three most recent periods (1994-1996, 1995-1997, 1996-1998), and the proposed restoration targets for three year running averages for nesting pairs (Ogden et al 1997), for the five species (Snowy Egret and Tricolored Heron combined).

Species	Base low/ high	1994- 1996	1995- 1997	1996- 1998	Target
GREG	1,163/3,843	4,043	4,302	4,017	4,000
SNEG/ TRHE	903/2,939	1,508	1,488	1,334	10k-20k
WHIB	2,107/8,020	2,172	2,850	2,270	10k-25k
WOST	130/294	343	283	228	1,500- 2,500

## Seasonal Timing of Nesting

The two species that have shown the greatest change in the timing of the initiation of nesting have been the White Ibis and Wood Stork (Ogden 1994, Ogden et al. 1997). During the base period, ibises initiated nesting about 0.5 to 1.5 months later than during an earlier, historic period (1930s-1940s). Storks on average initiated nesting about 2 months later. For this historic period, the average nesting initiation by White Ibises was early March, and for storks was early December. "Late" nesting has been associated with reduced numbers of nesting birds and reduced nesting success. During 1998, ibises initiated nesting in WCAs 2 and 3 in May, and storks in ENP initiated nesting in April. In addition to these two species, Great Egrets in the WCAs and ENP initiated nesting in mid to late March in 1998, about one month later than the recent normal timing of initiation. The restoration target is to see a shift in the timing of nesting to earlier in the dry season, to more closely match pre-project timing patterns.

## Location of Colonies

The restoration target for wading bird colony locations is the recovery of large, sustainable colonies in the area of the traditional marsh-mangrove ecotone sites. Prior to the C&SF Project, an estimated 75-95% of all birds of these five species that nested in the Everglades used colonies that were located in the southern Everglades-mangrove ecotone subregion. By comparison, an average of 26% nested in the ecotone subregion during the base years, 1986-1995 (range, 6-58%). It is hypothesized that the ecotone subregion, under pre-drainage conditions, provided higher densities of prey and a greater range of foraging habitat conditions than is possible in other portions of the system. In 1998, only 4.6% of the total nests by these five species were in the Shark Slough mangrove ecotone subregion (11% in 1996, 2% in 1997).

## Discussion

Great Egrets again met the numerical target set by Ogden et al. (1997). The remaining four species showed no improvement in numbers of nesting birds compared to the base years or the restoration targets. The running averages (see table) suggest that White Ibises have maintained stable nesting populations during the past three years, while small herons (Snowy Egret and Tricolored Heron) and storks, have experienced slow rates of decline.

There is a suggestion in the data that the total number of nesting birds has declined during the past three years, 1996-1998, compared to the base years. The annual mean number of nesting pairs for the base years was 6,900 (excluding the outlier year 1992, when 25,800 pairs nested, and excluding WCA 1 totals, where surveys were not conducted annually). The mean for the three recent years, 1996-1998, was 5,900 pairs, for the same subregions. The best nesting year in the recent period, 6,700 in 1997, was lower than the mean number of pairs for the base period. These data tend to support an overall impression that certain species continue to

decline as nesters in the Everglades basin, perhaps most notably the Snowy Egret. However, data from only three years probably are inadequate to show that this recent trend is real.

It is useful to remember that the numbers of nesting birds, both during the base period and the three most recent years, represent a substantial decline from the numbers that nested in the Everglades basin even as recently as the 1970s. For the six years 1974-1979, for WCA 3 and mainland ENP (including Frank Key), the annual mean number of nesting waders for these five species was 15,100 pairs (in thousands: 13.8 in 1974, 18.9 in 1975, 24.9 in 1976, 20.1 in 1977, 4.3 in 1978, 8.5 in 1979).

In 1998, none of the five species improved in seasonal timing or colony locations. The immediate cause for late nesting in 1998 probably was abnormally heavy winter rains and the delayed spring dry-down (see 1998 hydrology in this report). The nesting patterns during the most recent years suggest a continuing deterioration in the location of colonies, relative to the restoration target of increased nesting in the southern Everglades marsh-mangrove ecotone subregion. The percentage of the total number of birds (for the five species) nesting in the southern Everglades marsh-mangrove ecotone subregion in 1997 (2%) and 1998 (4.6%) was lower than the percentage nesting in that ecotone subregion in the poorest year during the base period (6.0%).

Two problems with the regional survey protocol, described in some detail in Ogden (1997), were not corrected for the 1998 surveys. These problems are, (1) inconsistencies in the survey protocol among the subregions, and (2) the fact that no survey is conducted in the Big Cypress basin. Where surveys include ground visits to colonies, much more accurate estimates of nesting by such species as Little Blue Herons, Tricolored Herons and Roseate Spoonbills are obtained. For example, no nesting Tricolored Herons are reported from mainland ENP, and the number of spoonbill nests reported from Florida Bay is well below the expected number. These low counts are almost certainly reflections of inadequacies in current survey protocols. Past information from the Big Cypress basin, which does not have regular colony surveys, indicates that large numbers of Great Egrets and Little Blue Herons nest there in most years (as well as Wood Storks in some years). Until these survey problems are resolved, the wading bird nesting record will not meet its potential as a measure of ecosystem restoration success.

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